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"The Copernicus Revolution"

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The Copernican Revolution by Thomas S. Kuhn. Harvard University Press, 1957, pp. xviii + 297.

James B. Conant who writes the Foreword and Thomas S. Kuhn of Berkeley, California, the author of this book, are deeply concerned that "the curious interplay of hypothesis and experiment (or astronomical observation) which is the essence of modern science" is largely unknown to the nonscientist. For "science is but one phase of the creative activities of the Western World which have given us art, literature, and music." Dr. Kuhn discusses the revolution in thought initiated by Copernicus in the manner which he believes to be needed if the scientific tradition is to take its place beside the literary tradition in our culture.

The Copernican revolution was of threefold significance. Astronomy had to cut the binding cords which for seventeen centuries had enmeshed it with the Aristotelian postulates and theories. Cosmology had to take full cognisance of the newly developing physics of the 150 years following Copernicus's death. All thinking men had to disentangle their Christian beliefs and theological doctrines, their natural philosophy and their cosmological speculations from the traditional, the hypothetical unit "ancient wisdom."

The early chapters deal with the task of the Greek observers who sought to explain the apparent motions of the sun, the moon, and the five visible planets about a central or near-central earth, against the background of the steadily moving sphere of the stars, complicated in the later years of their era by the discovery of the precession of the equinoxes.

Hellenic science is distinguished from Hellenistic science. The former was philosophical and only partially successful; Aristotle, "the Master of those who know," was its greatest proponent. The latter was geometric, to

some extent quantitative, exceedingly complicated, very beautiful, and much less unsuccessful; Ptolemy of Alexandria was its effective expositor.

In the thoughts of the early Christian Fathers these two lines of approach to cosmology were telescoped, though 500 years separated Aristotle and Ptolemy. The efforts of Augustine and Aquinas to square their readings of Aristotle with certain passages of the Scriptures are discussed in some detail. The influence of Dante is stressed in diffusing widely far beyond the ranks of scholars the Aristotelian universe both as the actual cosmological picture and as the symbol of man's life and future destiny.

The ideas of Nicole Oresme are given to illustrate how scholastic critics of Aristotle began to prepare men's minds for the drastic change which Copernicus's innovation was to bring about.

Fifty pages are devoted to De Revolutionibus and the next forty to the assimilation of Copernican astronomy in the years following 1543. To readers outside the ranks of astronomers, the book was somewhat unreadable, but the practising astronomers soon found many of Copernicus's mathematical techniques indispensable and thus its importance was recognized before large-scale clerical opposition came to a head.

Copernicus's prestige soared steadily in astronomical centres throughout Europe as the superiority of tables prepared by Erasmus Reinhold (1551) by Copernican methods became evident. Whether or not to assert belief in his cosmological postulates was another matter. John Donne felt that the new scientific theory would win out, but he and, fifty years later, John Milton were filled with apprehension for the future since "the Christian drama and the morality that had been made dependent upon it could not be adapted to a

universe in which the earth was a planet and new worlds could continually be discovered." The bitter Protestant opposition to Copernicanism is attributed to the desire of Luther and Calvin to return to a pristine Christianity based on the Bible as the single source of Christian knowledge.

From 1616 to the incredibly recent date of 1822 the Roman Catholic church made anti-Copernicanism a doctrinal issue, and in the earlier part of this period the grim weight of the Inquisition was directed against the Copernicans.

In spite of clerical opposition and lay timidity and conservatism of thought, the Copernican revolution moved on to its inevitable fulfilment through many stages of restatement. Chapters 6 and 7 outline the part played by Tycho Brahe, Kepler and Galileo and the contributions of René Descartes, Newton, and Robert Hooke. There follows a survey of the present scene with passing reference to Bohr, Planck and Einstein and to the fact that this century is witnessing a further revolution in cosmological thought.

The moral of the book is this: no scientific theory should be permitted to become a creed!

This book is well printed, contains two useful lists of reference books and a short technical appendix. It deserves to be read; whether it will achieve its author's worthy aim must be left to each reader to decide.


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